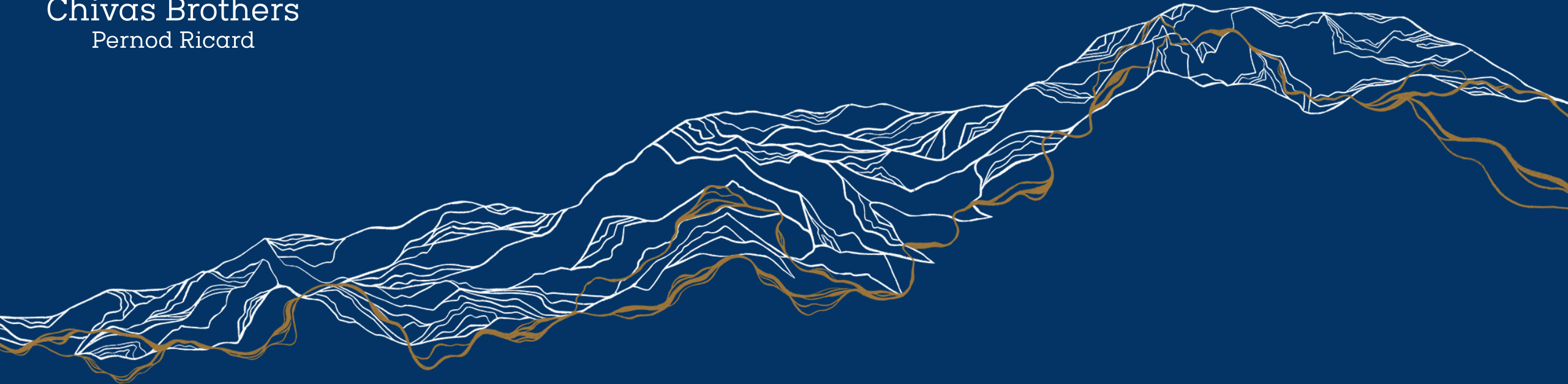




Chivas Brothers
Pernod Ricard



Evaluating nature-based strategies
in rural landscapes
for management of low flows

RONALD DAALMANS



Range of Ground & Surface Water Sources – process mainly from ground

**28
SITES
ACROSS
THE UK**

INCLUDING

13

SCOTTISH
DISTILLERIES

1

BOTTLING
FACTORY

300+

WAREHOUSES





Risk Assessment instigated by low flow events alongside rising production volumes

Site	Water Use		Regulatory Risk			Water Efficiency		Water Availability			Expansion	Temp
	Type	Source	RBMP	Q95	Design	Reasonable	Planned	Current HR	Future HR	Return	Sources	Return
	Process	Springs	●	●	●	●	●	●	●	●	●	●
	Cooling	River	●	●	●	●	●	●	●	●	●	●
	Process	Springs	●	●	●	●	●	●	●	●	●	●
	Cooling	River	●	●	●	●	●	●	●	●	●	●
	Process	Springs	●	●	●	●	●	●	●	●	●	●
	Cooling	River	●	●	●	●	●	●	●	●	●	●
	Process	River	●	●	●	●	●	●	●	●	●	●
	Process	Springs	●	●	●	●	●	●	●	●	●	●
	Cooling	River	●	●	●	●	●	●	●	●	●	●
	Cooling	River	●	●	●	●	●	●	●	●	●	●
	Process	Springs	●	●	●	●	●	●	●	●	●	●
	Process	Springs	●	●	●	●	●	●	●	●	●	●
	Cooling	River	●	●	●	●	●	●	●	●	●	●



BACKGROUND


CBL woodland planting impact assessment on water availability at low flows

Review of opportunities to use flood alleviation techniques to:

- Increase spring productivity
- Mitigate low flows impacts
- Limit water temperature rises

NERC Industrial CASE studentship


- Collaboration
- Innovation



Title:
Hydrological impact of native woodland planting at Glenlivet and Tormore distilleries

Report submitted to:
Chivas Brothers

Dated:
05/08/2013



Macaulay Scientific Consulting Ltd
Craigiebuckler
Aberdeen
AB15 8QH



Title:
Feasibility assessment on land management for spring source optimisation at Glenlivet distillery

Report submitted to:
Chivas Brothers Ltd

Dated:
March 2016



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Case Study: Nature-based solutions for management of water resources



Natural Environment Research Council



Chivas Brothers
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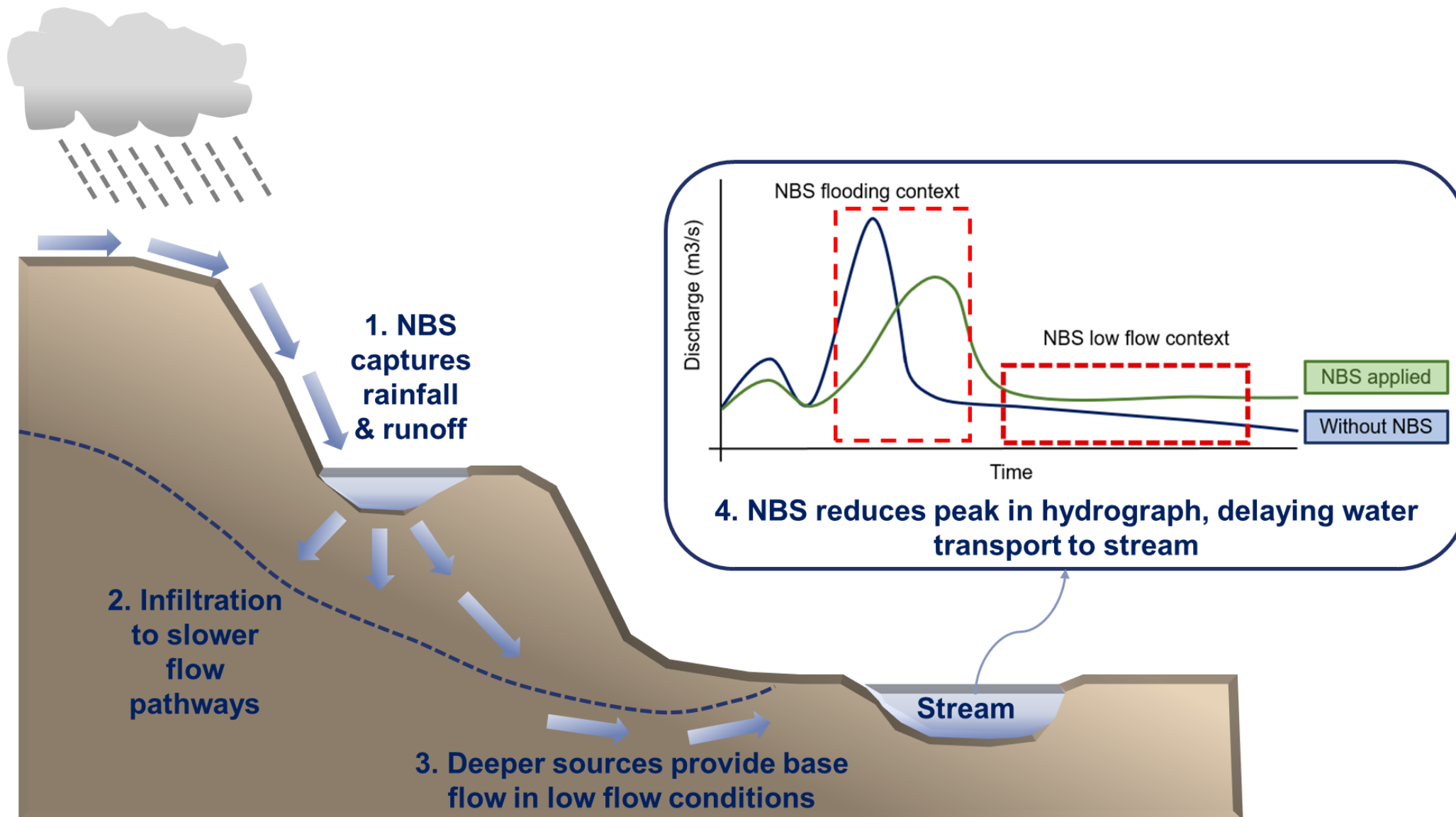
1493 UNIVERSITY OF
ABERDEEN



The James
Hutton
Institute



Nature Based Solutions (NBS) Concept





Nature Based Solutions

Use nature to help tackle environmental and social challenges, providing benefits to people and nature, and help us to mitigate and adapt to climate change

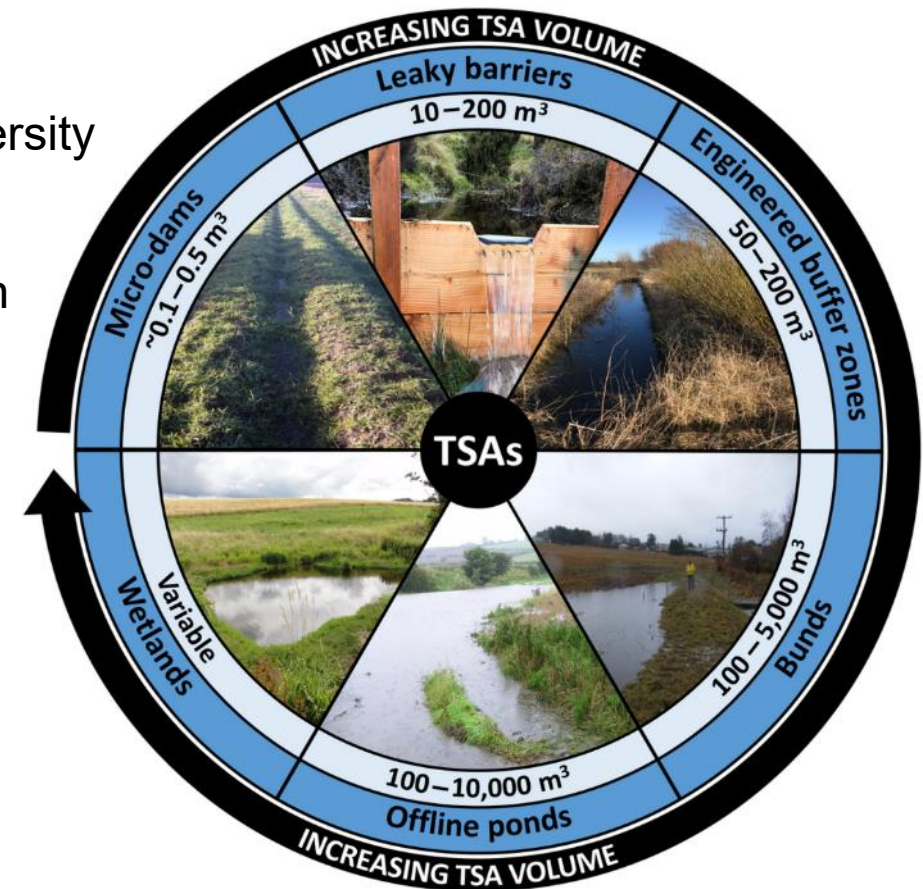
Flood mitigation

Reduce water temperatures

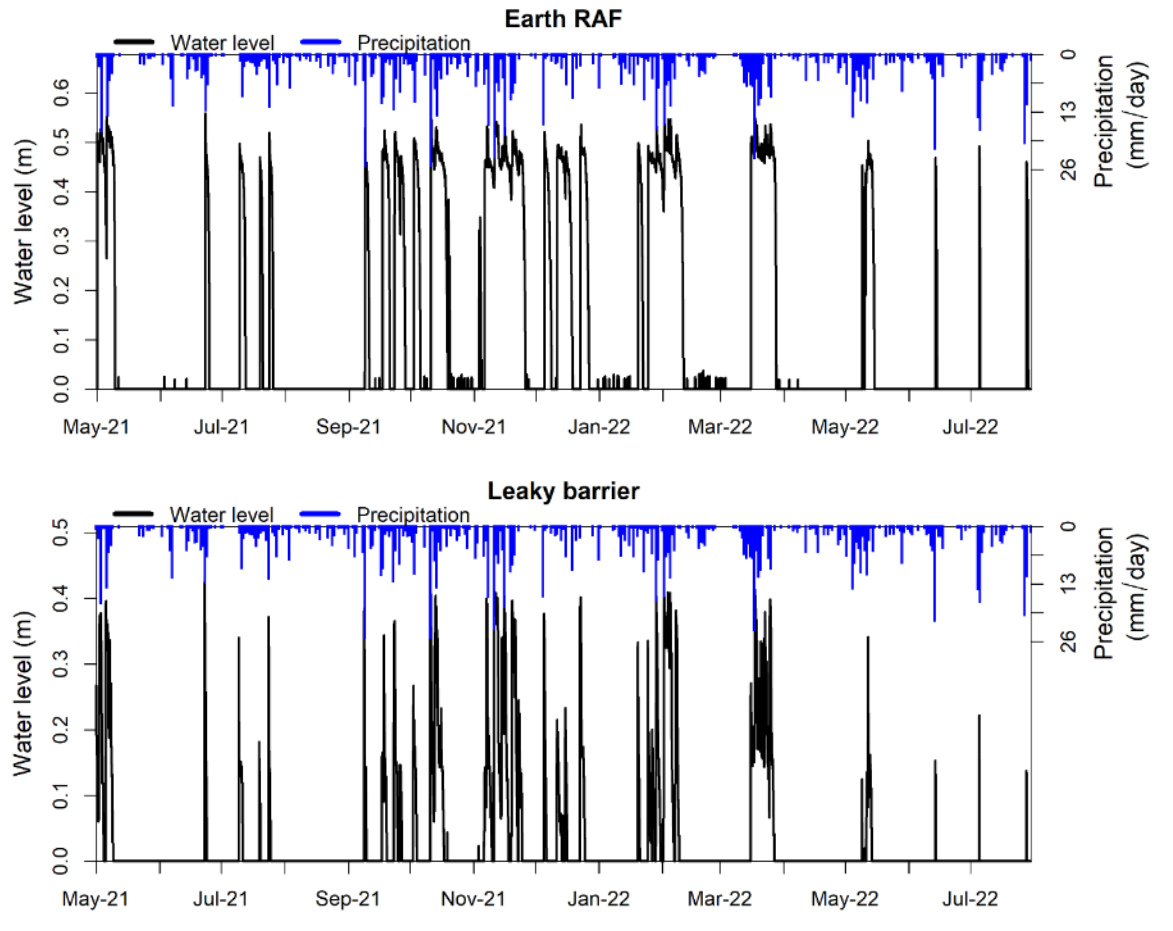
Enhancing low flows

Increase biodiversity

Carbon sequestration

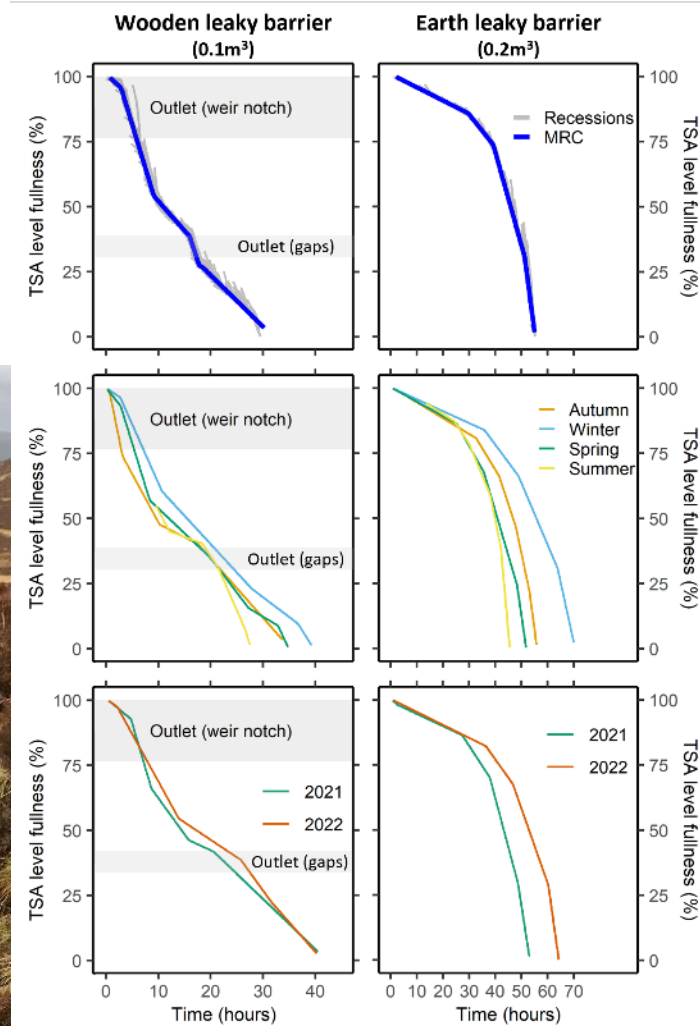


Small dams for runoff attenuation



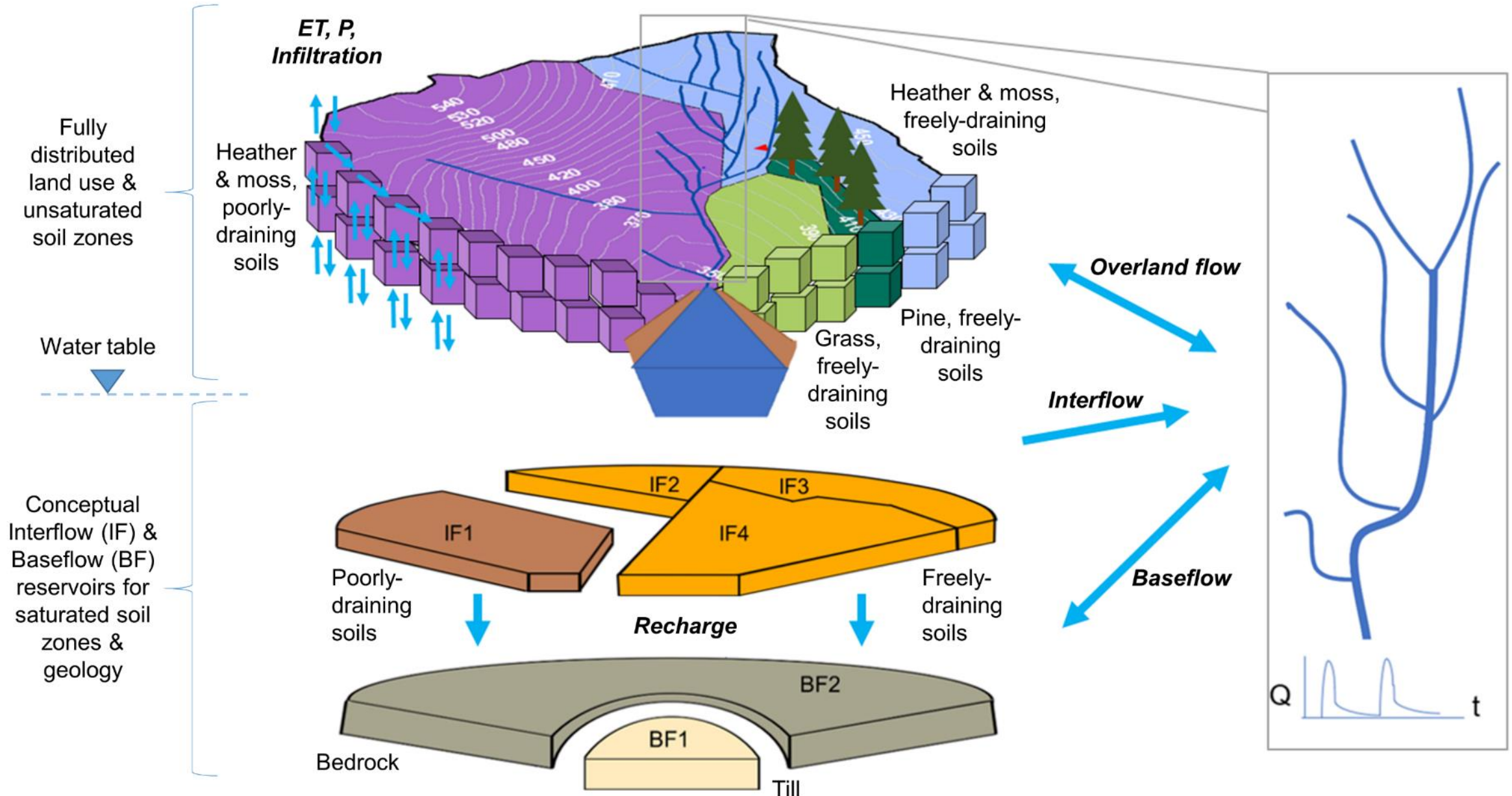


Monitored features



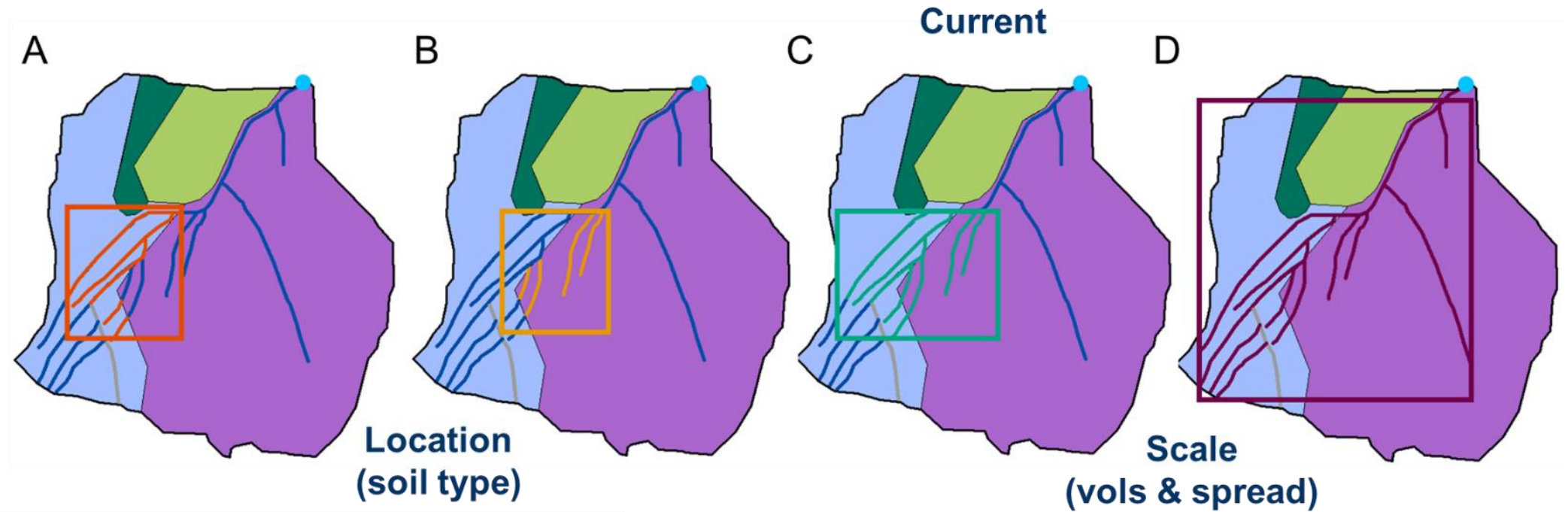
MIKE SHE 3D Catchment Model

MIKE 11 1D river network model





The importance of design: How big, how many and where?

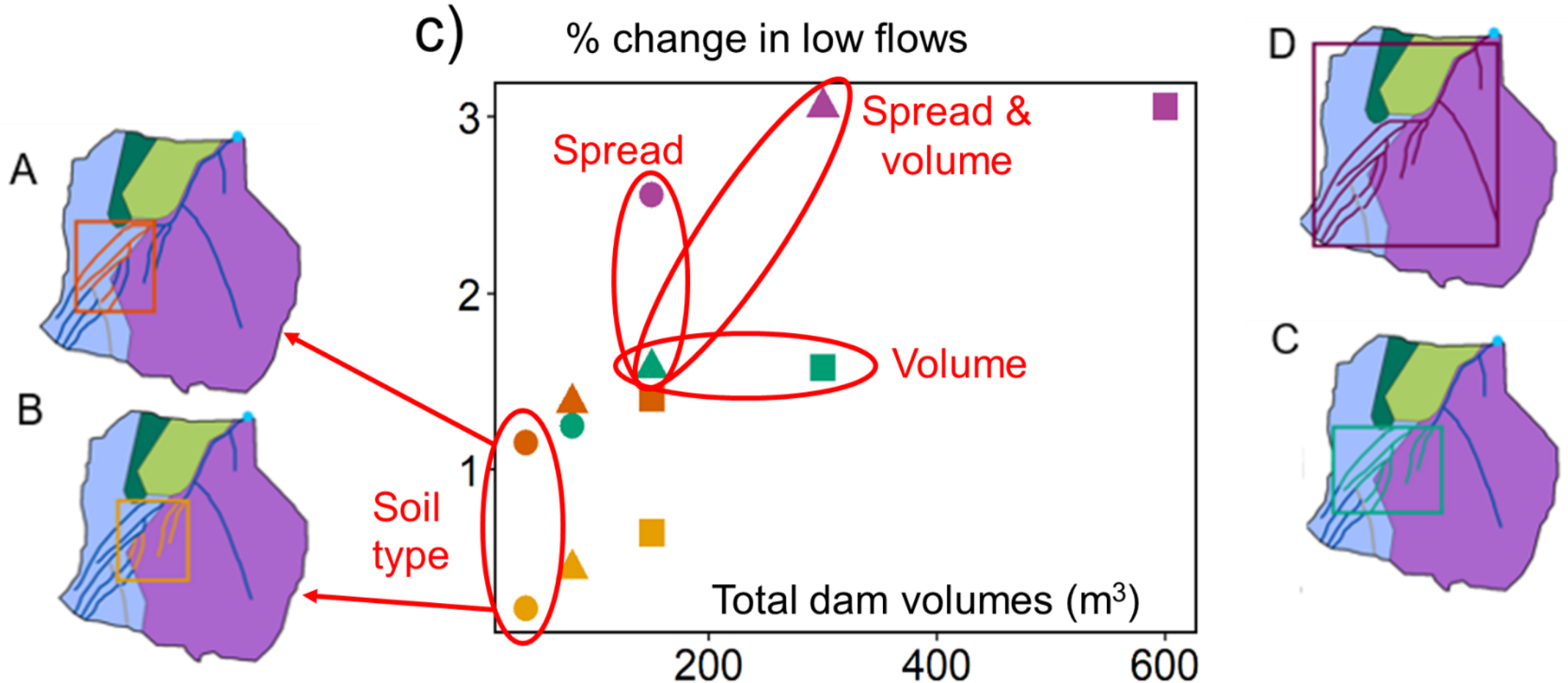


In-stream intervention zones

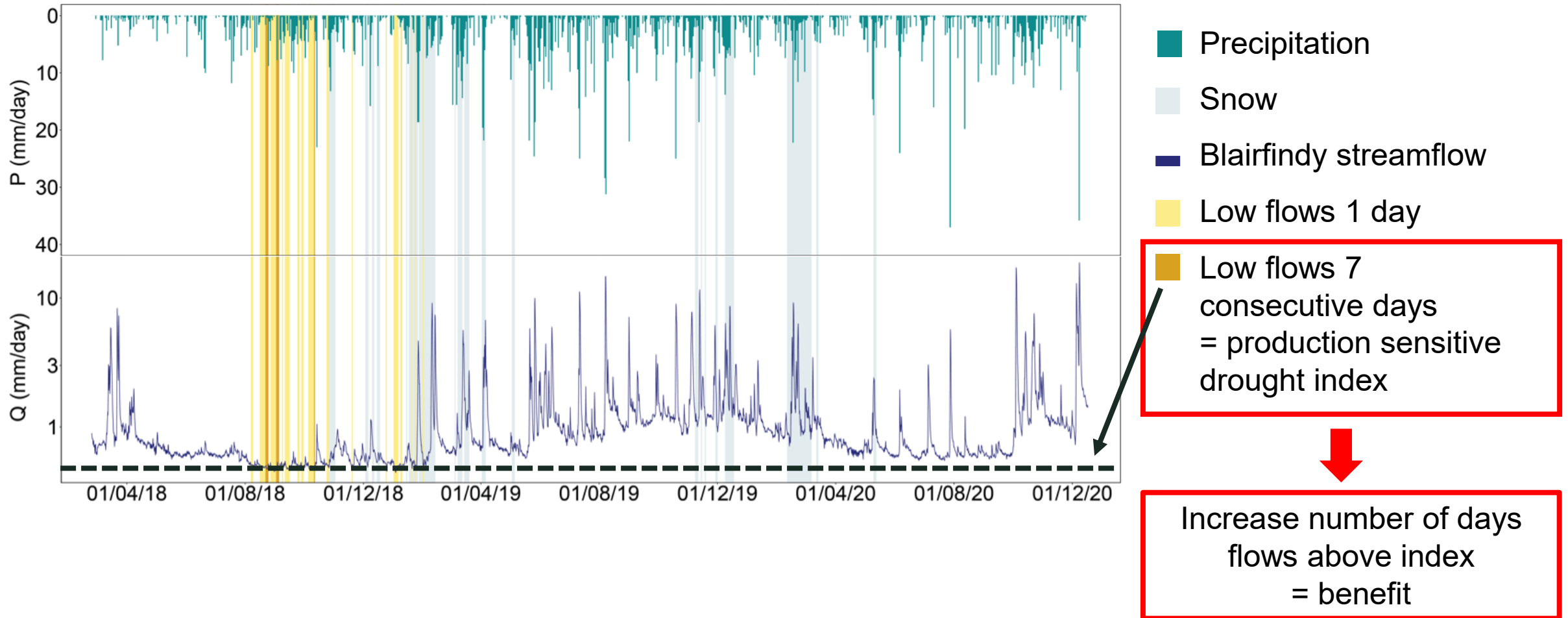
- A) Ephemeral streams, freely-draining soils
- B) Ephemeral streams, poorly-draining soils
- C) All ephemeral streams
- D) Throughout river network



Optimal dam design: freely draining soils, greater volumes, greater spread



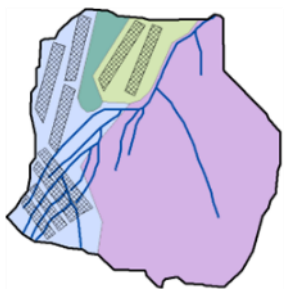
Calculation of benefits based on 7 consecutive low flow days



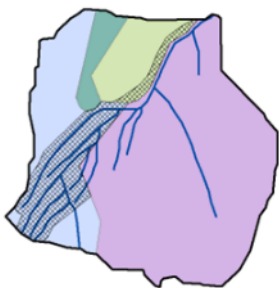


Benefits – Costs = Net Present Value

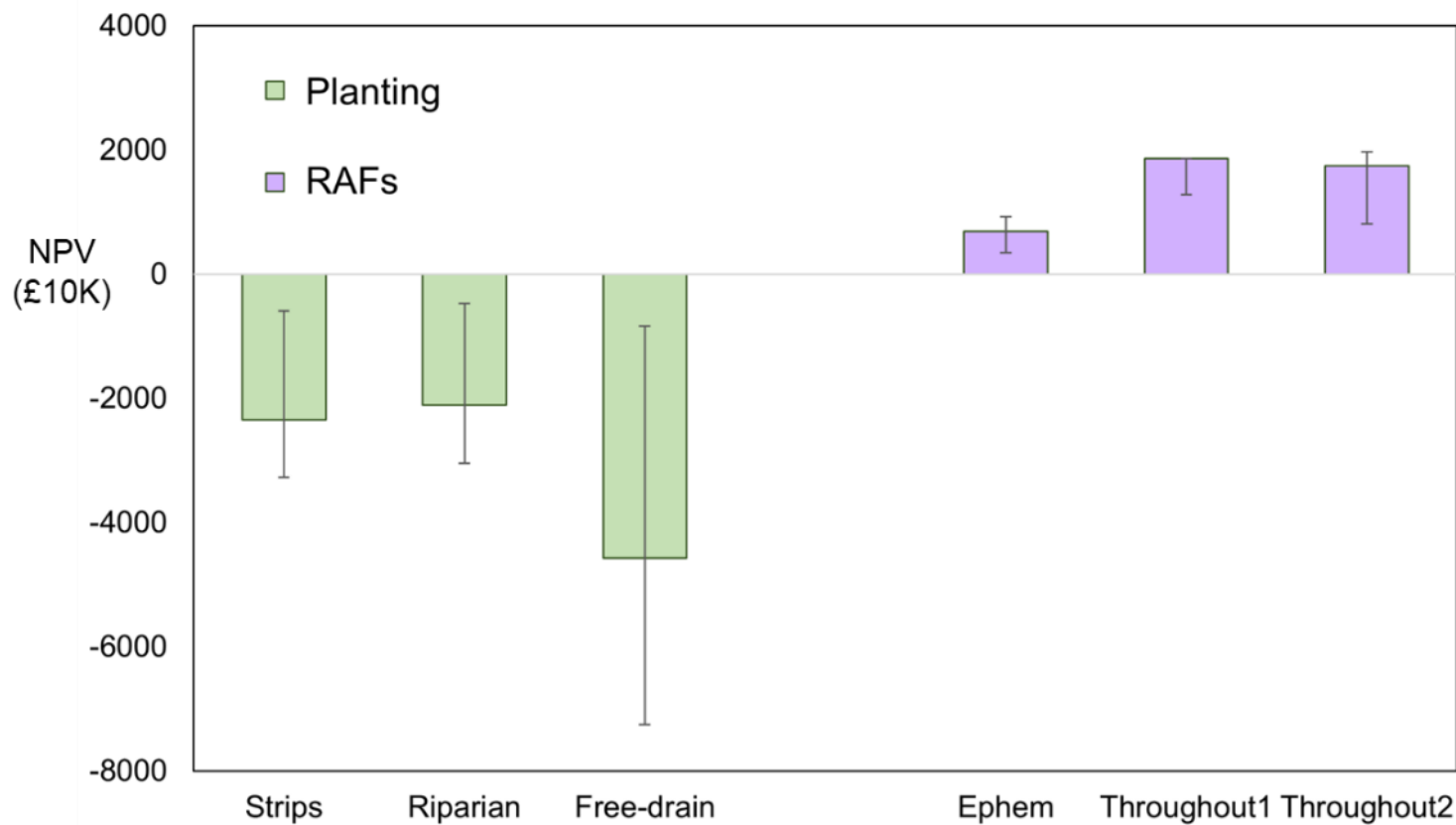
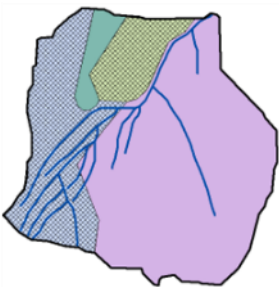
Strips



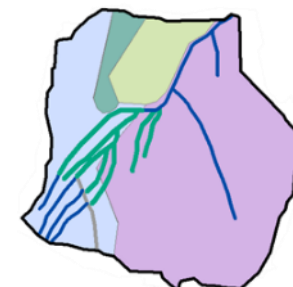
Riparian



Free-drain



Ephem



Throughout 1&2



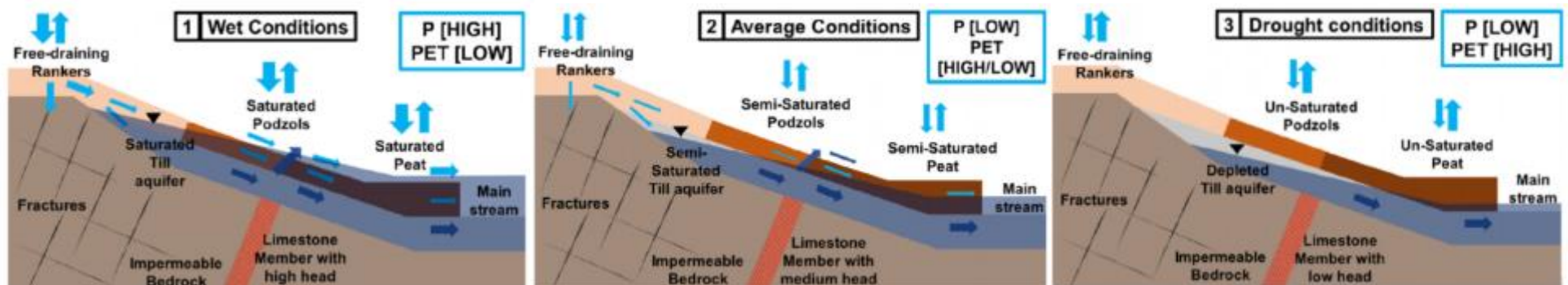


Future Research

Phase 2 PhD (2024 – 2028) – Jennifer Pirie



- Explore conceptual models on surface water – groundwater connections
- Transferability to other sites – location identification
- Provide guidance to the wider industry and other stakeholders



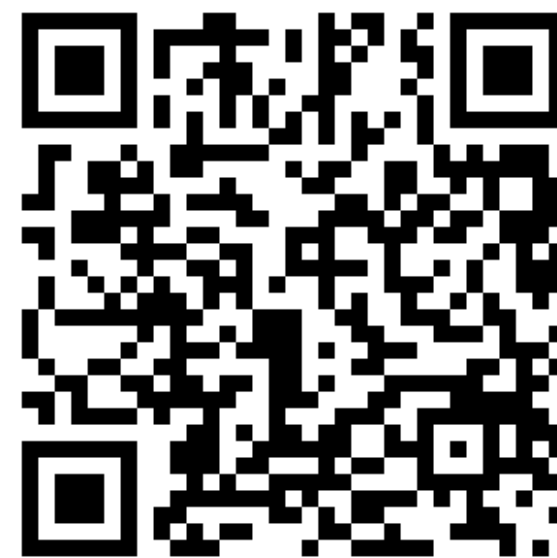


With thanks to:
Josie Geris, Mark Wilkinson,
Jessica Fennell, Martyn Roberts,
Chris Soulsby

Whisky weather?

BBC Weather presenters Nick Miller and Sarah Keith-Lucas head to Scotland to find out how The Glenlivet distillery is innovating to tackle climate change and maintain the quality of its whisky. They meet with scientists from the University of Aberdeen who are looking at what impact changing climates and higher temperatures in the future could have on the water supply to the distillery – a crucial element in the making of whisky.

25 August 2018
10 minutes





THE RIVER WITHIN

River Catchment Resilience Support Programme



A LONG-TERM PARTNERSHIP TO IMPROVE THE
HEALTH OF SCOTLAND'S RIVERS AND
RIVERBANKS

THE
RIVER
WITHIN


Chivas Brothers
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THANK YOU

Dr Ronald Daalmans

Environmental Sustainability

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